timing system TG-202

TG-202 in portable configuration with a companion, separately priced, radio receiver

TG-202 in rack-mounting configuration with optional comparator

DESCRIPTION/APPLICATIONS

Model TG-202 Timing System is *an integrated frequency standard and time code generator* that may be custom-built by the user with the capabilities required to suit his particular application.

Options include a rack-mounted or portable configuration, a choice of three orders of magnitude for the stability of the frequency standard and for the amount of frequency regulated output power — up to 1K VA. Alternative binary-coded or decimal in-line* readout, a time comparator*, and five standard time code programs developed by Geotech are available, as well as the Vela-Uniform** code for use in magnetic tape recording applications. Model TG-202 can also be modified to generate other time programs such as those adopted by IRIG and NASA.

Off-the-shelf options, A through N in the Table, are described on the following pages. We will be pleased to quote the cost of furnishing IRIG, NASA, other programs and other combinations of options upon request.

* Optional on rack-mounted configurations only.

** Vela-Uniform is the Department of Defense program for detecting and identifying underground nuclear explosions by seismic and other means. To locate these explosions, precision timing of the signals is required.

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MODEL TG-202 TIMING SYSTEM — TABLE OF OPTIONS

Configuration	Frequency Standard			Amplifier Output			Readout		Time Comp-arator	Standard Programs —See Explanation—									IRIG Programs	NASA Programs
	$1x10^7$	$1x10^9$	$1x10^8$	10 VA	100 VA	1000 VA	Binary Coded Decimal	Decimal In-Line		F1	F2	G	H	J	K	L	M	N		
Rack-Mounted, A-1	B1	B2	B3	C1	C2	C3	D1	D2	E	F1	F2	G	H	J	K	L	M	N	Available on Request	Available on Request
Portable, A-2	B1	B2	B3	Special Order			D1	N/A	N/A	F1	F2	G	H	J	K	L	M	N	Available on Request	Available on Request

OPTIONS

MOUNTING CONFIGURATIONS, A OPTIONS

A1 is a rack-mounting unit. A2 is designed to be housed in a portable carrying case.

FREQUENCY STANDARDS, B OPTIONS

B1, B2 and B3 specify the order of magnitude of stability of the frequency standard in terms of drift rate per day. B1 = drift rate less than 1 part in 10^7; B2 = less than 1 part in 10^9; B3 = less than 1 part in 10^8.
In addition, units with accuracies to 2 parts in 10^{11} can be provided at additional cost. For users who require the ultimate in stability, Model TG-202 can be modified for use with the Hewlett-Packard Model 5060A Cesium Beam Standard. In a laboratory environment there is no discernible drift with this configuration.

AMPLIFIER OUTPUTS, C OPTIONS

C1, C2 and C3 specify the power supplying capabilities of the frequency-regulated output; C1 = 10 VA, C2 = 100 VA, C3 = 1000 VA. They are normally available in the rack-mounted configurations only; C1 and C2 are integral while C3 is contained in a separate 7″ rack-mounting unit.

READOUT, D OPTIONS

D1 and D2 specify the type of readout presentation. D1 = Binary Coded Decimal; D2 = Decimal In-Line. Both readouts display time in seconds, minutes, hours and days. D2 is available in the rack-mounted configurations only.

TIME COMPARATOR, E OPTION

This option is a cathode ray tube time comparator with 1-second, 100-millisecond and 10-millisecond sweep rates. The system may be synchronized by displaying time signals from radio station WWV or other standard sources on the scope and superimposing the outputs of the internally generated time programs.

TIME CODE PROGRAMS, OPTIONS F THROUGH J

OPTIONS F1 and F2

Option F1 provides programs One and Two. Option F2 provides programs One and Three. Either option may be specified or both may be deleted.

Program One (contact closures)

(1) 133 milliseconds in duration occurring at 10, 20, 30, 40, and 50 seconds after each minute

(2) 500 milliseconds in duration occurring at 5, 10, 15, 20, 25, 35, 40, 45, 50, and 55 minutes after each hour

(3) One second occurring 30 minutes after each hour

(4) One second closure, one second open, and one second closure starting on each hour.

Program Two (contact closures)

(1) One second at each minute except 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, and 55 minutes

(2) Three seconds at 30 minutes after each hour

(3) Three second closure, 3 seconds open, and 3 second closure starting on each hour.

Program Three (contact closures)

(1) One minute closure, 1 minute open, and 1 minute closure with first closure beginning at midnight

(2) Same as (1) except beginning at 4 minutes after midnight

OPTION G, MAGNETIC TAPE

Program Four

A time program in the form of a binary coded pulse train, 3 volts in amplitude. Format conforms to Vela-Uniform specifications for recording on magnetic tape. Source impedance is 20K ohms and is provided balanced to ground, unbalanced to ground, and ac coupled. See Figure 1.

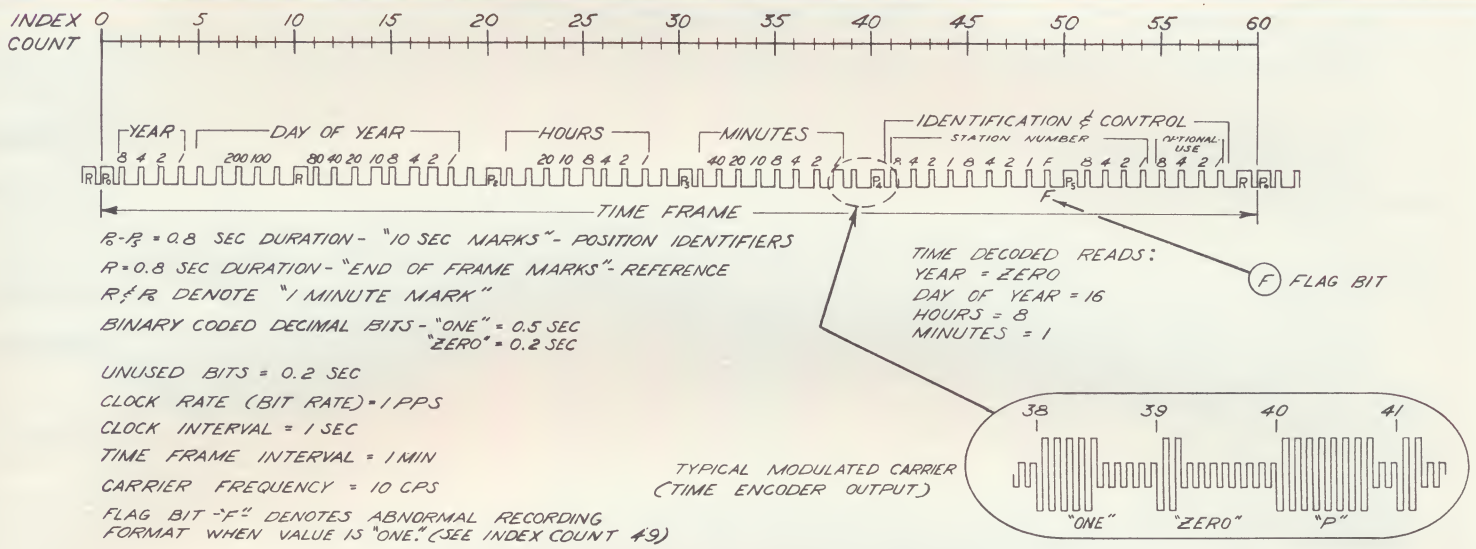

Figure 1. Vela standard time code for use with magnetic tape recording. (Adapted from IRIG recommended standard for range timing signals.)

OPTION H

Consists of two independent channels of Vela code as described in Option G.

OPTION J

Program Five

A secondary timing program as a backup to Option F. The secondary programmer is driven by a tuning fork oscillator and is independent of the primary standard frequency oscillator and count-down chain. In the event of a malfunction of Option F, the secondary programmer automatically provides: a 60 Hz signal to drive the power amplifiers (Option C); a 200-millisecond contact closure every 10 seconds on the short period contacts; and a 3 volt dc signal to indicate that the timing system is the in the secondary mode.

PROGRAM COMBINATIONS, OPTIONS K THROUGH N

Options K through N are combinations of Options F through J. The functions of these program combinations are equal to the sum of the functions of the individual programs, but due to the use of common parts are more economical to produce.

OPTION K

Combines Options F1 and G

OPTION L

Combines Options F2 and G

OPTION M

Combines Options F1 and J

OPTION N

Combines Options F2 and J

SPECIFICATIONS

OPERATING CHARACTERISTICS

Input

Radio signal voltage from 1 to 30 V p-p into an impedance of 5 kΩ; needed for the time comparator

Outputs

SEE TABLE OF OPTIONS

Options C1 through N

Standard frequency oscillator signal for heterodyning with WWV signal

Output to radio

Symmetrical square wave trains at 100 kc, 1 kc, 100 cps, 60 cps, 10 cps, and 1 cps.

Frequency-regulated decade outputs

At additional cost model TG-202 can be modified to produce any desired frequency–regulated output between 5 Mc and 1 cycle

ENVIRONMENTAL CONSIDERATIONS

Operating temperature range

–12.2° to 60°C (+10° to 140°F) on standard models. At additional cost the range can be broadened to –55° to 7°C (–67° to 170°F)

Storage temperature range

–55° to +85°C (–67° to +185°F)

Operating and storage relative humidity range

0 to 95% (noncondensing atmosphere)

Vibration sensitivity

Withstands peak acceleration of ± 5 g at 50 cps and prolonged vibration at resonant frequencies along all three major axes

Shock sensitivity

Packaged instrument withstands 30" free fall; suitable for mobile installations

Altitude operating range

Sea level to 15,000 ft; suitable for shipment by air

Fungus vulnerability

All circuits except contacts protected by fungus resistant spray finish

POWER REQUIREMENTS

Input voltage

22-28 Vdc

Power consumption with 10VA Amplifier	With 28 V input	With 22 V input
Display on[1] Power amplifier idling	20.7 W at 740 mA	14.1 W at 640 mA
Display on[1] Power amplifier off	14 W at 540 mA	10.5 W at 475 mA
Display off Power amplifier idling	15.1 W at 540 mA	10 W at 455 mA
Display off Power amplifier off	8.4 W at 300 mA	6.2 W at 280 mA
Display on[1] 8 W motor load on power amplifier	29.7 W at 1060 mA Amplifier output 130 V	19.6 W at 890 mA Amplifier output 108 V
Display off 8 W motor load on power amplifier	23.8 W at 850 mA	15.6 W at 710 mA

Power consumption with 100VA Amplifier

full load and programmer operating 114 W

Power consumption with 1000VA Amplifier

no load, 35 W; full load, 96% efficiency

[1]Ten lamps lighted

PHYSICAL CHARACTERISTICS

Basic dimensions

133 mm high by 483 mm wide by 502 mm deep (5¼ x 19 x 19¾ in.)

Net weight

16.3 kg (36 lb)

Shipping weight

22.6 kg (50 lb)

EQUIPMENT SUPPLIED

1 Timing System, Model TG-202

1 Card puller, Geotech #A-90-25042-01-01

1 Card extender, ADC *8-804-39AC-K31-62A

1 Tool, Tec #141029

2 Connectors (P1, P2), MS3106A-14S-7P

1 Connector (P3), MS3106A-18-12P

1 Connector (P4), MS3106A-18-1P

1 Connector (P5), MS3106A-125-3P

1 Connector (P6), MS3106A-18-12S

1 Connector (P7), MS3106A-16-10P

1 Connector (P8), MS3106A-20-19P

1 Cable clamp, MS3057-4

2 Cable clamps, MS3057-6

1 Cable clamp, MS3057-8

3 Cable clamps, MS3057-10

1 Cable clamp, MS3057-12

1 Operation and maintenance manual

ORDERING INFORMATION

Model TG-202 is available in any version that can be built from the options listed on the Table. When ordering (or when additional information is required) please refer to the *model number plus all desired options;* i.e., #TG-202-A1, B2, C2, D1, E, F1, J; #TG-202-A2, B3, D1, M.

PRICE LIST

Effective
15 August 1966

TIMING SYSTEM, MODEL TG-202

Prices subject to change without notice.

Option	Description	Standard Versions –01	–02	–03	–04	–05	Option Price
A1	Rack Mounted	X		X	X	X	$2,300.00
A2	Portable		X				2,375.00*
B1	$1x10^7$ Frequency Standard						675.00
B2	$1x10^9$ Frequency Standard	X	X		X		850.00
B3	$1x10^8$ Frequency Standard			X		X	775.00
C1	10 VA Amplifier						265.00
C2	100 VA Amplifier	X			X	X	275.00
C3	1000 VA Amplifier						700.00
D1	BCD Readout	X	X	X	X	X	210.00
D2	Decimal Readout						1,140.00
E1	Time Comparator	X		X		X	415.00
E2	Cover Plate				X		N/C
F1	Programs One and Two						315.00
F2	Programs One and Three						345.00
G	Program Four						675.00
H	Program Four, 2 each, independent						700.00
J	Program Five		X	X	X	X	475.00
K	F1 & G			X		X	750.00
L	F2 & G		X		X		795.00
M	F1 & J	X					675.00
N	F2 & J						710.00
	TOTAL	$4,725	$4,705	$4,925	$4,905	$5,200	

*Carrying Case not included

Ordering/Pricing Information

For your convenience we have given version numbers to five popular groupings of options; TG-202-01, TG-202-02, TG-202-03, TG-202-4 and TG-202-05. The total prices ** for these models appear at the bottom of their respective option columns.

Alternative option groupings are ordered by adding the desired option designations to the basic model number. For example, #TG-202-A1, B2, C2, D1, E1, F1, J; or TG-202-A2, B3, D1, M. Total prices ** are obtained by adding the individual option prices.

WARRANTY

All Geotech products are fully warranted against faulty material and workmanship for one year from date of shipment.

PRICES

**Prices are F.O.B. Garland, Texas. A 5% of total order charge is added to cover the cost of packaging and handling for overseas shipment.

TERMS

Domestic terms are net 30 days. Foreign terms are an irrevocable letter of credit to our bank, the Republic National Bank of Dallas, Texas, prior to shipping.

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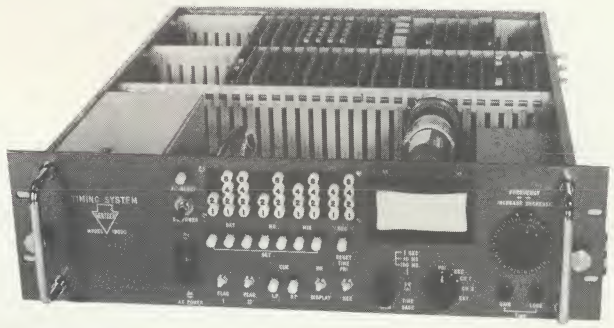
Technical Data

PURPOSE

This system is designed for time program applications where stabilities as great as 1 part in 10^9 are required. By request, the system can be modified to generate time programs such as those adopted by IRIG and NASA. The standard system generates the time codes required for short-period and long-period seismographs, the VELA-UNIFORM code for use with magnetic tape recording, and a weight-lift calibration program for short-period and long-period seismographs. In addition, the system provides up to 100 volt-amperes of 115 vac, 60 Hz, frequency regulated power for a variety of applications.



OPERATING CHARACTERISTICS

INPUTS

J6 - Radio signal voltage from 0.1 to 10 v rms into an impedance of 5K ohms, for use as a reference time mark with the time comparator

J6 - Input to compare external signal to internal time standard of system

OUTPUTS (1)

J1 and J2 - VELA-UNIFORM standard code for recording two independent channels on magnetic tape

J3 PRIMARY TIME PROGRAM - consisting of the following contact closures: (2)

PROGRAM ONE (SP)

133 msec closures at 10, 20, 30, 40, and 50 seconds after each minute

500 msec closures at 5, 10, 15, 20, 25, 35, 40, 45, 50, and 55 minutes after each hour

1000 msec closures at 30 minutes after each hour

1000 msec closure, 1000 msec open, 1000 msec closure on each hour

PROGRAM TWO (LP)

1000 msec closure at each minute except 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, and 55 minutes after each hour

3000 msec closure at 30 minutes after each hour

3000 msec closure, 3000 msec open, 3000 msec closure on each hour

WEIGHT-LIFT PROGRAM

1-min closure, 1-min open, 1-min closure daily at midnight (0000) on output 1 and repeated 4 minutes later (0004) on output 2

J3 SECONDARY TIME PROGRAM - Consisting of a 60 Hz square wave and a 200 msec closure every 10 seconds for short-period seismograph only

J4 - Frequency regulated decade consisting of symmetrical square wave trains of 100K Hz, 10K Hz, 1K Hz, 100 Hz, 60 Hz, 10 Hz, and 1 Hz

J5 - Low level HF sine wave for heterodyning with WWV radio broadcast

J7 - Frequency - regulated power consisting of a 115 vac, 60 Hz, 100 va, symmetrical square wave. Optional power levels of 10 and 1000 va are available (1000 va in separate package)

READOUT - Optional (binary coded decimal or decimal in line)

TIME COMPARATOR - Optional, built-in oscilloscope

DRIFT RATE - Optional, $1/10^6$, $1/10^7$, $1/10^8$, $1/10^9$ per day

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ENVIRONMENTAL CHARACTERISTICS

TEMPERATURE RANGE
- OPERATING - -12 to +60°C (+10 to +140°F) on standard models
- STORAGE - -20 to +85°C (-4 to +185°F)

HUMIDITY RANGE - 0 to 95%, relative

VIBRATION SENSITIVITY - Will withstand peak of ±5 g and prolonged vibration at resonant frequencies

SHOCK SENSITIVITY - Packaged instrument with - stands 30-inch free fall; suitable for mobile installations

OPERATING ALTITUDE RANGE - Sea level to 4572 m (15,000 ft); suitable for shipment by air

POWER REQUIREMENTS

DC POWER - 130 w maximum at 28 vdc with 100 va source fully loaded, bcd readout operating, and time comparator operating

PHYSICAL CHARACTERISTICS

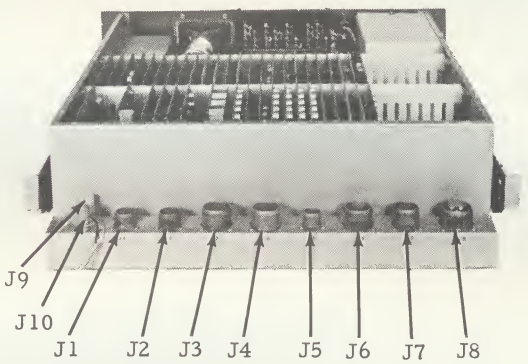
BASIC DIMENSIONS
- HEIGHT - 133 mm (5.25 in.)
- WIDTH - 483 mm (19 in.)
- DEPTH - 503 mm (19.75 in.)

NET WEIGHT - 16.3 kg (36 lb)

SHIPPING WEIGHT - 22.6 kg (50 lb)

CONNECTORS

J1 and J2 - Receptacle MS3102A-14S-7S; mating plug MS3106A-14S-7P
J3 and J4 - Receptacle MS3102A-18-1S; mating plug MS3106A-18-1P
J5 - Receptacle MS3102A-12S-3S; mating plug MS3106A-12S-3P
J6 - Receptacle MS3102A-18-12S; mating plug MS3106A-18-12P
J7 - Receptacle MS3102A-16-10S; mating plug MS3106A-16-10P
J8 - Receptacle MS3102A-20-14S; mating plug MS3106A-20-14P
J9 and J10 - Binding Post 111-112 (violet) and 111-102 (red)



(1) Optional - Any one or all

(2) Optional - mercury wetted or dry reed

POWER AMPLIFIER, GEOTECH MODEL 22183

PURPOSE

This power amplifier is a solid state device designed to produce up to 1 kva of frequency-regulated 60 Hz, square wave, 105 to 135 vac power. It is intended to serve as a companion unit to Timing System, Model 19000, but it can be used with any standard frequency oscillator having the characteristics specified below.

OPERATING CHARACTERISTICS

INPUT - Square wave, 60 Hz ±1 Hz, rise time less than 100 μ sec, amplitude of 2.2 to 3.5 v, symmetrical within ±2% feeding into a 750 ohm load

EFFICIENCY - Over 90% at full load

ENVIRONMENTAL CHARACTERISTICS

TEMPERATURE - -12 to +60°C (+10 to +140°F)

HUMIDITY - Will operate in noncondensing atmosphere

VIBRATION AND SHOCK - Will withstand up to ±5 g

POWER REQUIREMENTS

INPUT - 22 to 28 vdc from 40 ampere source, ripple must not exceed 4 v p-p

OUTPUT - 105 to 135 vac, 60 Hz, square wave, 1 Kva maximum, protected against overloads and short circuits

PHYSICAL CHARACTERISTICS

BASIC DIMENSIONS
- HEIGHT - 178 mm (7 in.)
- WIDTH - 483 mm (19 in.)
- DEPTH - 432 mm (17 in.)

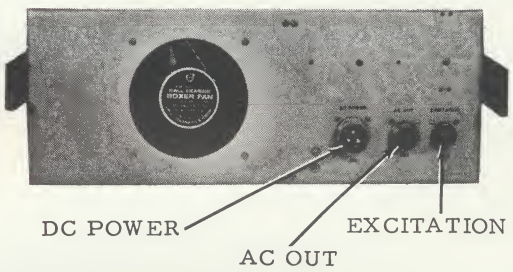
NET WEIGHT - 30 kg (66 lb)

CONNECTORS

SIGNAL - Receptacle MS-3102A-14S-7S; mating plug MS-3106A-14S-7P

DC POWER INPUT - Receptacle MS-3102A-20-19P; mating plug MS-3106A-20-19S

AC POWER OUTPUT Receptacle MS-3106A-16-10S; mating plug MS-3106A-16-10P



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